

# AN EXAMINATION OF THE CITY OF GEORGETOWN, BRITISH GUIANA, FOR THE BREEDING PLACES OF MOSQUITOS

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The coast line of British Guiana is really an alluvial mud flat, characterised by its flatness and by its lowness of level, which is four to five feet below that of the sea at high water of spring tides. Its soil is heavy alluvial clay, mixed with marine salts and vegetable deposits. The city of Georgetown lies at the angle of this low-lying sea coast and the mouth of the Demerara river. As its level is below that of the sea, the city and the cultivated lands around it require embankments on every side. Sluices on these embankments at suitable times of tide give vent to the surface drainage of the land. The city is intersected by numerous trenches and open drains, varying from two to ten feet wide, which discharge the surface water alone. Water for drinking is rain water collected from the roofs and conserved in large wooden vats and iron cisterns.

There is a further water supply carried by pipes and distributed to the various parts of the city, used mainly for fire purposes, but also for flushing, washing stables, watering, etc. This supply is a brown peaty water, obtained through an open trench from an empoldered area some ten miles from the city. Sewage disposal is mainly by cess-pits; in a few limited areas the pail system is utilised.

In June, 1909, as an outcome of suggestions of Sir R. Boyce, it was proposed to make a close examination of Georgetown, with reference to the breeding places of the myriads of mosquitos always present.

Difficulties arose as to the right of entry of the Staff of the Bacteriological Department on premises, and it became necessary

to await the passing of a Mosquito Ordinance bestowing powers of entry; this was achieved in September, 1910.

This mosquito survey was begun in December, 1910, and was finished in September, 1911, and was carried out by the following persons duly authorised by the Honourable the Surgeon-General:—The Government Bacteriologist, the Assistant Government Bacteriologist, Dr. Duncan, and two skilled Laboratory Attendants specially trained for the work.

In spite of the size and great extent of this city of 60,000 inhabitants, it was decided to enter, examine and report upon all premises, lots, yards, etc., within its boundaries, and no premises were left unvisited. The parks and other open spaces, Government buildings, barracks, etc., were visited and reported upon. The trenches in various parts of the city and outskirts were systematically examined as to the conditions under which they were breeding or likely to breed mosquitos. In addition, certain pastures and waste lands lying to the windward side of the city were also surveyed.

Special notice was directed to the kind of mosquito larvae or eggs found, the nature of the places in which breeding was actually occurring, to potential breeding places (i.e., where breeding might occur at times other than that of this visit of inspection).

Records were also made of the condition of the vats, the extent and efficiency of screening and also of the general condition of the yards.

During the progress of this survey, as opportunity occurred, occasion was taken to interest the people in this subject, and numerous (50 to 60) small lectures delivered.

Two thousand five hundred and sixty premises were entered and examined, and of these 1,490 were found to be breeding mosquitos at the time of inspection.

A detailed statement of the above particulars with respect to each lot and half lot occupied has been tabulated and forwarded to the Honourable the Surgeon-General.

The following table shows concisely the various districts of the city, the time of the year when examined, the number of premises, the number and percentage of those breeding mosquitos the number of premises breeding *Stegomyia fasciata*, *Culex fatigans*, *Anopheles (Cellia) albipes* and other mosquitos:—

District	Date of examination	Premises	Those breeding mosquitoes	Percentage	Stegomyia fasciata	Culex fatigans	Anopheles	Other Mosquitos
Kingston	Dec., 1910- Feb., 1911	131	71	54.2	58	27	0	0
Stabroek	Feb., 1911	126	64	50.7	58	9	0	<i>Culiseta taeniorhynchus</i> 7
Queenstown	Feb., 1911	101 much unoccupied land	78	77.2	70	15	2 premises frequent in unoccupied land	<i>Culiseta taeniorhynchus</i> 9
Charlestown	March-May, 1911	254	198	77.9	181	20	1	<i>Culex confrmatus</i> 1 <i>Culiseta taeniorhynchus</i> 2
Alberttown	May-July, 1911	269	221	82.1	202	38	8	<i>Aedomyia squami- penna</i> 2
Cummingsburg	Aug.-Sept., 1911	245	152	62.0	138	35	2	<i>Culiseta taeniorhynchus</i> 1
Bourda	Sept., 1911	399	131	32.9	125	15	0	0
Lacvtown	Sept., 1911	319	133	41.6	125	12	0	0
Robbstown and Newtown	Sept., 1911	48	12	25.0	11	0	1	0
Werken Rust	Sept., 1911	333	201	60.3	175	37	3	0
Wharves, Riverside	Sept., 1911	53	18	33.8	18	1	0	0
Wortmanville	Sept., 1911	182	145	79.6	138	34	2	<i>Melanoconion atratus</i> 1
Railway line	Sept., 1911	100	66	66.0	63	7	2	<i>Aedomyia squami- penna</i> 2
Total	...	2560	1497	58.3	1392	250	21	25

From this it will be seen that all parts of the city are affected alike; premises of the rich and poor are equally involved.

The following table indicates the number of vats screened, defectively screened and totally unscreened, the number of premises with potential breeding places, and also the number of these premises kept in a disgraceful condition:—

Ward	Vats screened well	Vats screened defectively	Vats unscreened	Potential breeding places	Disgraceful yards
Kingston ... ..	83	51	6	73	13
Stabroek ... ..	103	102	8	70	6
Queenstown ... ..	64	70	8	90	36
Charlestown ... ..	184	155	12	204	26
Alberttown ... ..	197	122	0	241	8
Cummingsburg ... ..	646	284	13	214	18
Bourda ... ..	333	138	13	216	24
Lacytown ... ..	283	213	12	185	22
Robbstown and Newtown	43	15	2	14	8
Werken Rust ... ..	421	170	6	275	68
Wharves, Riverside ...	99	20	6	28	4
Wortmanville ... ..	145	51	1	162	34
Railway line ... ..	4	5	1	76	4
Totals ... ..	2605	1396	88	1848	271

The Anopheline mosquitos (nearly always *Cellia albipes*, occasionally *Cellia argyrotarsis*) were found breeding in nearly all trenches, *where overgrown with vegetation*, both in the city and environs. Where no vegetation was permitted no Anopheline larvae were discovered. These mosquitos were also found breeding in the hollowed-out stumps of trees which had been cut down in the lots and by the roadside. Numerous Anopheline larvae may be found during the rainy seasons, in the small grass-grown cross-drains of the Queenstown district. They may occasionally be met with in cocoanut shells and in the grass-grown pools and trenches around the barracks.

The developmental forms of the various Culicine mosquitos were most frequently met with, and the breeding places may be summed up as follows:—

*Stegomyia fasciata* (syn. *S. calopus*) was found breeding in vats, water barrels, tubs, tins, pots, cisterns and defective gutters in the majority of the premises infected, including the river wharves and the premises on the railway line. The breeding places were always close to human habitations, and were never found in trenches or unoccupied land.

*Culex fatigans* was found breeding in vats, tanks, barrels, tubs and old tins on about one-tenth of the premises visited.

*Culex confirmatus* was found once in a pond in Charlestown.

*Melanoconion atratus* was found breeding in open trenches and ponds covered with vegetation such as in Thomas Street, in the pools of the railway line, the 'Governor's fish pond,' and the trenches by Kelly's dam.

*Culicella taeniorhynchus* was a frequent habitant of trenches, more especially those by the military barracks, Kelly's dam, and the sea wall.

Of the Aedine mosquitos only one specimen was found, viz.: *Aediomyia squamipenna*. This was found breeding in trenches and ponds covered by vegetation in Thomas Street, the 'Governor's fish pond,' and by Kelly's dam.

In the vats, barrels and tubs, the larvae found were almost always *Stegomyia fasciata* or *Culex fatigans*.

In old tins, broken crockery, bottles, calabashes, cocoanut shells, fallen palm sheaths, etc., almost always the larvae found were those of *Stegomyia fasciata* and *Culex fatigans*. Occasionally, under these circumstances, *Culex similis*, *Culicelsa taeniorhynchus* or *Culex confirmatus* were found.

In the trenches, when cleansed of vegetation, no evidence of mosquito breeding was found, but where vegetation covered the surface numerous larvae of Anophelines and *Aediomyia squamipenna* and *Melanoconion atratus* were discovered.

The 'Governor's fish pond' illustrates excellently the influence of vegetation in giving protection to the larvae from the ubiquitous predaceous fish (*Girardinus poeciloides*). When cleared of vegetation, frequent examination failed to reveal larvae. The presence of larvae was coincident with the growth of vegetation.

In the trenches and open lands to the windward side of the city, where vegetation is associated with the water, larvae of Anophelines, *Culicelsa taeniorhynchus*, *Aediomyia squamipenna* and *Melanoconion atratus* were readily found.

Those premises on which potential breeding places were found numbered 1,848, or 70·9 per cent. of all premises visited. While many such potential breeding places were defectively screened vats, old pots and tins, the great majority were barrels. On no less than 1,203 premises were one or more barrels holding either rain water or the peaty water from the Lamaha Conservancy. On only 11·5 per cent. of these premises was any attempt at screening a barrel shown, and on the greater number of this small minority the screening (generally very defective) was only vouchsafed to one or two out of numerous barrels.

The systematic inspection of the vats (this does not refer to iron cisterns or tanks) shows that 63·9 per cent. were effectively screened. One thousand three hundred and ninety-six vats had more or less defective covers nullifying any beneficial effect of screening. In several instances pieces of wood were used to prop open an otherwise efficient vat cover, thus rendering the purpose of the cover useless.

In many vats an efficient cover had been put on and then completely neglected; the sun drying the unseasoned wood caused warping and the production of large cracks.

Eighty-eight vats were found in which there was no attempt at screening.

A most serious disadvantage under which the inhabitants of this city allow themselves to labour is the excess of vegetation and litter in the yards and lots. No less than 261 premises were kept in a condition which can only be described as disgraceful. The exclusion of the sun keeps the premises damp and dark, and provides excellent cover and breeding places for mosquitos, rats, and other noxious insects, vermin, etc. The exclusion of fresh air and the general dampness encourage and aid the spread of tuberculosis.

The extraordinary collection on some premises of old tins and other worthless rubbish giving rise to stagnant water has to be seen to be believed.

The city of Georgetown is richly supplied, not only with mosquitos but also with convenient and comfortable breeding places. It seems almost impossible to realise that during the wet season over 70 per cent. of all premises in this city are breeding countless myriads of these pests, and that during the dry season nearly 60 per cent. are equally incriminated.

This state of affairs, occurring as it does in a city priding itself on being up to date, is scarcely to be credited, and reveals the urgent necessity for vigorous and prompt action by those responsible for the health of the city.

Undoubtedly the presence of numerous unscreened barrels contributes most to this state of affairs, and the close screening of a barrel and the provision of a tap near the bottom should be a *sine qua non* for even tolerating their existence.